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SCIENTIFIC AFFAIRS

No. 661

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BRIEFS

GDR RESEARCH APPARATUS FOR USSR--Scientific apparatus for the screening of polarized neutrons from the Magdeburg "Otto von Guericke" Technical College was dispatched to Dubna at the beginning of the week; it will be used in Dubna by scientists of the Soviet Union and the GDR. [AU211450 East Berlin NEUES DEUTSCHLAND in German 20 Nov 79 p 1 AU]

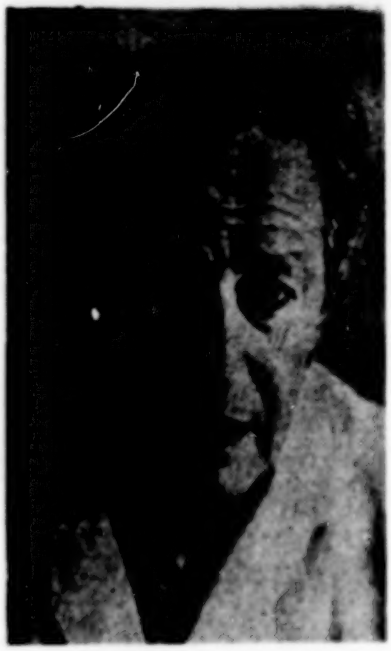
CSO: 2302

PROFILE OF SCIENTIST IN BIOCHEMISTRY, MOLECULAR BIOLOGY

Sofia VECHERNI NOVINI in Bulgarian 22 Dec 79 p 4

[Article by G. Sveschtarov: "Dedication"]

[Text]



Prof Rumen Georgiev Tsanev, M.D., corresponding member, director of the Institute of Molecular Biology, elected academician in molecular biology.

Prof Rumen Tsanev, M.D. is one of the most outstanding Bulgarian scholars in the field of biochemistry and molecular biology. His scientific research has made him an international authority. He majored in medicine in 1946. In his students' years his efforts were already directed toward scientific work in the field of biochemistry and cellular biology. As soon as he finished his higher education he joined the Institute of Applied Biology and Development of the Organisms under the leadership of Doncho Kostov, an internationally known academician in genetics. These were the years when molecular biology was taking its first steps in discovering the role of nucleic acids in synthesis of proteins, in cellular proliferation (cell growth and development) and in the hereditary properties of the organisms. Later on, at the Institute of Biology of BAN [Bulgarian Academy of Sciences], Doctor Tsanev chaired the department of cytology and cytochemistry, which department gradually became the Central Biochemical Laboratory of BAN. Since 1960, Prof R. Rsanev has been the director of this scientific center, which later became Institute of Biochemistry and in 1976 was transformed into Institute of Molecular Biology.

Academician Rumen Tsanev is a scholar who spends most of his time in the laboratory. His first scholarly studies were devoted to the clarification of the mechanisms of injury, inflammation and regeneration of the tissues and the role of nucleic acids in these processes. He has established that the substances resulting from breaking up of the ribonucleic acids in the injured cells are a biological factor (signal) which triggers the activity of the defensive and regenerative mechanisms, which in the final analyses leads to healing of the injuries. Later on these studies led Professor Tsanev to his research on the (mehalcomes) of cell division and differentiation.

During the past few years, the personnel of the Institute of Molecular Biology, under the leadership of academician Rumen Tsanev, have devoted their efforts to one of the unresolved fundamental problems of molecular biology, which has an enormous practical significance as well: the problem of the mechanisms of cellular differentiation in the higher organisms, or, how the fertilized ovum develops into an organism with most varied differentiated cells which synthesize different specific proteins.

It is known that through the replication (duplication) mechanism, the information encoded in the DNA molecule is fully passed on to the sister cells through each cell division. Consequently, some king of mechanism must exist that gradually limits the activity of the individual genes in the different cells during the development of the organism. For this purpose, some pattern must also exist that the limitations follow accordingly. Furthermore, there must also be a way of identifying those sections of the DNA that will be used and those that will be blocked.

The identification of the mechanisms in this process is closely connected with the knowledge of the structure of the genetic apparatus of the higher organisms. Some data show that the problem of cellular differentiation is closely connected with the malignant mutation of the cells whereby the mechanisms controlling cell growth are seriously impaired. Therefore, the discovery of the essence of cancer is not possible unless the molecular mechanisms that control the cellular differentiation in the higher organisms are known.

For resolving these problems, Prof R. Tsanev has used first of all the methods of the mathematical pattern, working jointly with Prof Bl. Sendov of the Institute of Mathematics and Mechanics of BAN. This joint work resulted in the new idea that besides the information on protein synthesis encoded in the

DNA, the higher organisms must also have another kind of information embedded in the pattern that the protein components in the chromatin (hereditary substance) follow, and which on its part determines the growth as well as the cellular differentiation. This idea proved to be helpful and is supported in more recent studies. Professor Tsanev and Professor Sendon received the Dimitrov Award for their research on the mathematical pattern.

The most recent studies of Academician R. Tsanev are devoted to electron-microscopic and biochemical research on the chromatin structure. These studies show that the basic building unit of chromatin, the nucleosome, has a twofold structure, i.e. it consists of two halves. This structure was confirmed by foreign authors as well. And most recent data show that it plays an important role in the chromatin functioning.

It is generally assumed that regulating the activity of the genes is one of the most important problems in the world. Therefore, the future scientific work of Academician R. Rsanev will also include purposeful research in this field and more specifically, further study of the chromatin structure with the purpose of finding the mechanisms of the cellular differentiation. These studies are also related to many important practical problems, for example, the malignant mutation of the cells, the fight against viral deseases, etc.

Let us wish our distinguished scholar and all other scholars with whom he works many more scientific successes in their efforts of resolving one of the most complex problems involving the living organism.

1010
CSO: 2202

STUDIES TO DEVELOP NEW PHOTOPROCESSING METHODS

Sofia RABOTNICHESKO DELO in Bulgarian 17 Dec 79 p 4

[Article by Stoyanka Atanasova: "Laser Photography"]

[Text] I am calmly looking at "museum exhibits." I see behind the glass a numismatic collection of Thracian valuables, ancient decorative items, some of Levski's personal things, and the binding of a 17th century New Testament. Suddenly I see a plaster of Paris impression of a head and unwittingly I try to touch it. My fingers touch the cool glass. People around me giggle. For a moment my instinct has proven stronger than my mind. However, the illusion of seeing a tangible subject is complete. However, I am not in a museum but am looking at holographs at the Central Laboratory for Optical Recording and Data Processing of the Consolidated Physics Center of the Bulgarian Academy of Sciences.

The word holograph comes from the Greek words "cholos" and "graphos," meaning full recording. It is substantially different from a photograph whose major shortcoming is that the recorded image is entirely flat. The holograph has the advantage of transmitting one of the basic characteristics of objects--their dimensions in space. The purpose of the holograph is not to provide an exclusively visual effect. It is a prestigious engineering subject. It is used to record and store a tremendous amount of data, for which reason it is in demand. It makes it possible to detect various metal deformations, follow rapidly developing processes, make three-dimensional copies of artistic and historical valuables, etc.

In our country work on the comprehensive problems raised by holography has been underway for the past 15 years. A specialized unit of the Bulgarian Academy of Sciences was created in 1975. One of the most important topics on which extensive and active research is conducted is the development of suitable recording media.

Until recently no hypothesis had been formulated to trace the link between the diffraction and the size of the grain showing in photographic emulsion. Such a hypothesis was developed at the Central Laboratory for Optical Recording and Data Processing, by Scientific Associates Metodi Kovachev, Psvetana Mateeva, and Ventseslav Suynov. It is quite interesting and original and may be used in all recording media. According to it the maximum diffraction effectiveness which could be obtained with silver emulsions is 77 percent and the size of the developed grains is under 100th of a micron.

The hypothesis was proved experimentally as well. A scientific collective, headed by Senior Scientific Associate Anton Katsev developed an excellent medium for argon and helium-neon laser (or, respectively, the blue-green and red areas of the spectrum). The maximum diffraction effectiveness for such environments of reflective holographs is over 60 percent, which is better than results achieved abroad.

With the active participation of Scientific Associate Margarita Mazakova and Scientific Associate Marga Pancheva, the laboratory is also developing a continuous medium (bichromated gelatin) without a grainy structure. It has a transparency of ordinary glass. It is light resistant and has an exceptionally high diffraction effectiveness of up to 95 percent. It is still in the laboratory stage of development. The efforts of the collective are focused on stabilizing the technology for the manufacturing of a corresponding light-sensitive material and finding a suitable means for its development. The laboratory associates are participating in the Interkosmos program as well. The holograph diffraction grids they have developed have been mounted on original Bulgarian space equipment. The characteristic feature of such grids is that they have the property of optical lenses. They are considerably lighter than the conventional ones and may be used in big telescopes and complex optical elements.

Like any new science holography is looking for connections with other fields of human knowledge. Currently it is making its way toward one of the most humane sciences--medicine. Laboratory specialists are seeking methods for holographically processing so-called balistocardiograms. This will make the early detection of cardial diseases possible. The efforts of the associates are also focused on obtaining a three-dimensional holographic image of one-dimensional X-ray photographs. Three dimensional depictions of internal organs would greatly facilitate medical diagnosis.

Holography is very promising in the field of science and technology. The work of the Bulgarian scientists is related mainly to practical application and the development of new theoretical directions in physics.

5003
CSO: 2202

BULGARIAN MAGNETIC DISC, MAGNETIC TAPE STORAGES

State of the Art

Budapest SZAMITASTECHNIKA in Hungarian Nov 79 pp 8

[Article by N. Botev, B. Tsonev, T. Topalov, Zh. Paskalov and B. Khristova: "Magnetic Disc Storages"]

[Text] The first ESZR [Uniform Computer Technology System] magnetic disc storage, the ES-5052 with 7.25 Mbyte capacity, was developed in 1970 and series manufacture began in 1971. Several versions have been prepared since; they developed the ES-5061, a 29 Mbyte capacity background storage, the IZOT 1370 minidisc and the ES-5074 floppy disc.

Last year ended with a great achievement--development of the ES-5067-02 disc unit with a capacity of two times 100 Mbytes was completed. This storage combines new technology, a new operational principle for handling large masses of data, great data transmission speed, short access time, a high degree of reliability and convenient operation.

The first ES-5067-02 storages with 2x100 Mbyte capacity have appeared but the developers took another step, preparing the ES-5067 with a capacity of 200 Mbytes (in one disc pack). Both devices were displayed at this year's jubilee ESZR exhibit operating in an R-35 configuration with an ES-5667 control module or an ES-5567 control device. The ES-5067-02 storage also operated in an R-25 and an R-55 configuration.

We can say that we have mastered the technology of servo-surface magnetic disc storages. It is not our intention, however, to limit the application of these large capacity storages exclusively to the ESZR system. There are very many minicomputers which require large capacity disc storages. So we are concentrating our efforts primarily on the development of magnetic disc storages which we will be able to use in MSZR [minicomputer system] systems also.

Those developing magnetic discs must keep the following points of view in mind:

--increasing operational speed,
--increasing reliability,
--improving software support,
--improving the environmental factors guaranteeing the operation of the magnetic disc units, and
--decreasing the price.

Satisfying these requirements depends to a large extent on so-called module technology (including exchangeable information modules and "super-package" fixed modules).

So the most important problems are the following:

--development of a hermetically sealed information module which will contain the disc pack, reading-writing heads, head armatures and the axle;

--development of new types of reading-writing heads (including semi-conductor technology);

--adapting new coding methods for work surfaces and servo-surfaces in order to increase the longitudinal and cross-sectional writing density; and

--increasing information transmission speed.

Modern disc surfaces make it possible to increase information writing density by 20-30 percent without any changes. It is probable that the possibility offered by even thinner but evenly distributed coating will be exhausted with the surface smoothness developed to decrease the distance between head and surface. We now predict a limit of 400 bits per mm and 40 bands per mm.

The dimensions and mass of the magnetic heads will decrease further. Problems are caused not only by amplification of a signal weakly read from the surface, with noise which can hardly be decreased, but also by the fact that signal amplitude changes because of the unevenness of head movement. Configuration development and the small mass (less than 10 grams) will make it possible for the reading-writing heads to move smoothly (striking and floating).

Modern servo systems using electronic positioning use one servo-head in a complex of 20-30 reading-writing heads. Since precise tracking of the center line of the band is possible only on the servo-surface the precision of radical justification is of increased significance in regard to all other heads, especially in the case of great cross-sectional density. We see two possible solutions to this problem:

--the design of non-exchangeable information modules; and
--the use of universal reading-writing heads to read the servo-information of the bands themselves.

One way to increase longitudinal density is optimalization of the combination of coding methods (error correction code--ECC). We are seeking methods in the utilization of which every single magnetization will correspond to more than one information bit. By using an appropriate error correction code--regardless of the fact that only a small area is available on the band to write check and correction information--writing density and reliability on the band will increase.

Increasing the capacity of the magnetic disc unit cannot be made independent of that system in the configuration of which it figures.

New techniques, for example microprocessors, will be used in magnetic disc storage too. Reliability can be increased with the help of these because diagnostic and error signal control of the interface--the servo-system--will take place with microprocessors.

Mini-magnetic disc units will be developed too. There are many minicomputer applications where the expectations are as follows:

--compactness, which makes it possible to build technical devices into standard cabinets;

--the possibility of operation in areas without air conditioning; and

--simple service, reliability and low price.

It will be necessary to develop mini-magnetic disc units in two different groups to satisfy the different requirements:

--cassette storages with capacities of 6-12-24 Mbytes; and

--disc storage modules with exchangeable or fixed information carriers and a maximum capacity of 80 Mbytes.

The floppy discs needed for minicomputers constitute a third group of magnetic disc storages which will be developed in regard to both storage capacity and data transmission speed.

It will be characteristic of these groups that the design of the mechanical and electromechanical units will follow the same principles, which is useful economically from the viewpoint of both operation and manufacture.

Another new development is buffer storage (usually built on a principle of a connection between electric charge magnitudes) which can be regarded as a form of hierarchic organization between the control unit and storage. These storages have very small capacity but with their aid the operational speed of the disc subsystem can be increased by an order of magnitude. This requires no configurational change because it preserves full program compatibility.

Of the three most important parameters (capacity, information transmission speed and average access time) the first two will improve significantly (with values approaching 50-100 Mbytes and 1,600-2,000 Kbytes per second) while reliability will increase substantially and the price of the products will decrease.

In our opinion magnetic disc storages will remain competitive for the next 10-15 years and will continue to have a defining role among large capacity storages.

[Caption of photo at top of page: Two IZOT 1370 minidiscs in an SZM-4 minicomputer system.]

Research and Development

Budapest SZAMITASTECHNIKA in Hungarian Nov 79 p 9

[Article by H. Momerin, T. Topalov, T. Popov and M. Kolarov: "Development of Magnetic Tape Storages"]

[Text] The fact that computers are used on a massive scale in science, technology, economic life, guidance and other activities has resulted in the creation of information systems which require large storage capacity. External storages working with magnetic data carriers have been developed to increase the memory capacity of the computers. It has become urgent to decrease the size of computer technology equipment and external storages used in automated guidance and process control systems.

In recent years Bulgaria has specialized in the manufacture of external storages; the country is included among the large manufacturers of computer technology. Magnetic tape storages with modern parameters were developed in a short time in conjunction with Soviet experts. Among these parameters we might mention the large quantity of information stored, the great efficiency (high information transmission speeds and short access times), the increased operational reliability, the esthetic workmanship and the appropriate design. It is primarily these factors which have aroused interest in us.

The development of magnetic tape storages goes in two directions:

--large magnetic tapes with tape speeds of 2-5 meters per second; and
--mini-magnetic tapes with tape speeds of 0.3-2 meters per second

Large Magnetic Tape Units

The large magnetic tapes have been developed on the basis of two different basic designs as two families of equipment.

The first family follows the design of the ES-5012 and the second follows the design of the ES-5003.

The ES-5012 was the "pioneer" for Bulgarian magnetic tape development and it is constantly being perfected. This simple and cheap equipment is used primarily in the ESZR 1 series.

The ES-5612 magnetic tape unit realizes the highest level of this design; it works with a tape speed of 3 meters per second and uses the FK/BVN-1 method of writing. This equipment is used together with the ES-5525-03 control equipment.

This design also includes the following magnetic tape storages:

--The ES-5012-03 with a tape speed of 3 meters per second and a BVN-1 method of writing; and

--The ES-5012-01 with a tape speed of 2 meters per second and a BVN-1 method of writing

The two devices work in ESZR systems together with ES-5517 or ES-5512 control equipment. The other basic design, the ES-5003, offers substantial advantages. Tape loading is automatic, the tape speed is fast (5 meters per second), tape rewinding time is short (45 seconds), the cassette can be used with a loading adapter, it is equipped with a vacuum monoroller, tape movement is air cushioned, the reading-writing heads are of hard alloy, etc. This design can be used successfully in both the ESZR-1 and ESZR-2 series.

The most modern equipment of the family is the ES-5003; it has a tape speed of 5 meters per second, an FK/BVN-1 writing method and is equipped with a multiplex diagnostic interface.

In ESZR systems the ES-5003 magnetic tape storage is controlled by the ES-5503 with ESZR-2 software.

The second device of this design is the ES-5003.03. This uses an FK/BVN-1 writing method, the tape speed is 3 meters per second and a modified interface has been developed for operation in a subsystem with an ES-5025.03 control unit. Interface exchange was solved with a variable NYAK.

Both families of large magnetic tape units were developed on the basis of monoroller, start-stop operation tape drive mechanisms; in the first the magnetic reading-writing heads are placed vertically, in the second they are placed horizontally; in the transient start and stop conditions vacuum columns serve to even out the differences deriving from the characteristics of the motor driving the monoroller and the cassette motors. Tape loading is automatic in the ES-5003 and semi-automatic in the ES-5012; the latter takes place with the aid of the end of tape.

Control of the motor of the monoroller and of the cassette motors of the tape drive mechanism takes place with discrete servosystems. The servosystem of the motor of the monoroller indicates the actual speed of the magnetic tape with a tachometer--the transmitter is placed on the axle of the driving electric motor--information pertaining to the status of the tape goes to the servosystem of the cassette motors from transmitters placed in the vacuum columns.

Information is recorded on the magnetic tape with the writing heads with the aid of the electric currents of the writing track. The writing amplifier built into the magnetic tape storage using the BVN-1/FK combined writing method performs its function with the aid of a 7445 decoder. In the case of the BVN-1 writing method there is conpensation for the static gap skew of the vertically written byte.

The reading head reads the information on the magnetic tape with the aid of circuits in the read track. In the case of magnetic tape units using the combined (BVN-1/FK) writing method there is compensation for the static gap skew of the byte read. The general control principle of the tape unit makes possible easy transfer from one interface to another.

The following are protected as inventions: the modular structure of the ES-5003 magnetic tape unit; control of the monoroller and cassette motor in the case of the ES-5003 and the ES-5003.30; control of the monoroller in the case of the ES-5612 and the ES-5012-03; control of the cassette motor of the ES-5012.03; and the reading and writing tracks in the case of the FK/BVN-1 writing method.

The table shows the technical characteristics of the several models (large magnetic tape units).

Mini-Magnetic Tape Units

The mini-magnetic tape storages are characterized by slower tape speeds and greater compactness. Two different families have been developed in Bulgaria; one uses cassettes of 216 mm diameter and the other uses cassettes of 267 mm diameter. The two families differ from one another in size and in regard to the design of the tape drive mechanisms. The tape drive mechanism uses a start-stop monoroller system. An arm-like mechanism evens out the parametric differences appearing in the transient start and stop conditions of the monoroller motor and the cassette motors. This is single stage in the case of the low speed equipment and double stage for those with fast operation.

Loading of the magnetic tape is semi-automatic with the aid of end of tape or of a preparatory mechanism prior to use. Analog servosystems control the motors of the tape drive mechanism; signals indicating the speed of the magnetic tape go to these systems from a tachogenerator operating with direct current. The tachogenerator is located on the motor axle of the monoroller; the position of the arms is set by a blended photo transmitter.

Table

Parameters	Large Magnetic Tape Units						Mini-magnetic Tape Units		
	ESZ 5012.01	ESZ 5012.03	ESZ 5612	ESZ 5003	ESZ 5003.03	IZOT 5003	SZM 5300	SZM 5302	IZOT 5006
1. Tape speed (m/sec)	2	8	3	5	2	0.32	0.32	0.62	1.12
2. Rewind speed (m/sec)	5	7	7	18	15	2.50	2.50	3.80	3.80
3. Write form (number of channels)	9	9	9	9	9	9	9	9	9
4. Write method	BVN-1	BVN-1	FK/BVN-1	FK/BVN-1	FK/BVN-1	BVN-1	BVN-1	BVN-1	BVN-1
5. Writing density	32/8	32/8	63/42	63/42	63/32	32	32	32/8	32/8
6. Information transmission speed, Kbytes/sec	64/16	96/24	189/96	315/160	124/64	10	10	16/4	32/8
7. Tape width (mm)	ISO+00 12.7+01	ISO+00 12.7-01	ISO+00 12.7-01	ISO+00 12.7-01	ISO+00 12.7-01	ISO+00 12.7-01	ISO+00 12.7-01	ISO+00 12.7-01	ISO+00 12.7-01
8. Diameter of tape cassette	267 ISO	267 ISO	267 ISO	267 ISO	267 ISO	267 ISO	267 ISO	267 ISO	267 ISO
9. Interface	potential	potential	potential	multiplex	potential	potential	potential	potential	potential

The two mini-magnetic tape unit families can be connected to MSZR configurations through control modules. In addition, they can be used with supplementary controls in other data preparation and storage systems.

The BVN-1 writing method is used in the mini-magnetic tape units. The good properties of the reading-writing heads make it possible to use static gap skew compensation only in the write mode.

The characteristics of the models belonging in the mini-magnetic tape families are summarized in the table. The general developmental and perfection trends for magnetic tape units are increasing efficiency and reliability. This can be achieved by using writing methods which ensure greater writing density (group coding to the mini-magnetic disc units) and by using new elements and circuits to perfect the tape drive mechanisms. There is continual work in the interest of increasing the recording density for information and in the interest of reducing access time.

Mass storages occupy a stressed position in research; these are characterized primarily by very fast access time and the ability to store large masses of information.

[Photo caption: The ES-5612 and the ES-5003.03 magnetic tape storages.]

8984
CSO: 2502

PAPER USED BY COMPUTERS LOCALLY PRODUCED

Sofia OTECHESTVEN FRONT in Bulgalrian 27 Dec 79 p 2

[Report by Zakhari Nikolov: "Paper for Computers"]

[Text] The regular production of such paper will be started in 1980.

Currently computers are used to process data supplied by virtually all large enterprises and combines in the country, summing up results of research conducted by scientific institutes, contest examinations, warehousing, etc. The processed data are recorded on printouts using special imported paper. This paper is quite different from standard brands in terms of strength and elasticity.

Some 1.5 years ago specialists of the Chemical Technology of Timber Department of the VKhTI [Higher Chemical and Technological Institute] in Sofia undertook laboratory experiments to develop a technology for the production of such paper domestically. Using additives and compositions of various cellulose materials used by the paper mills in the country, the specialists were able to develop entirely suitable paper for computers. It is identical to the imported paper in terms of strength and whiteness, and can be easily perforated without subsequent deformation. Following successful industrial tests at the V. Kolarov State Paper Factory in Kostenets, the initial quantities of the new paper were used in several computer centers. At the beginning of 1980 regular production will be undertaken, thus stopping the importing of computer paper. Savings of 300,000 foreign currency leva per year are expected.

5003
CSO: 2202

BULGARIA

DEFICIENCIES OF BULGARIAN COMPUTERS OUTLINED

Sofia TRUD in Bulgarian 7 Jan 80 p 2

[Article by Veselin Spiridonov, deputy director of Bulgarian-Soviet Interprogram Institute: "Are Our 'Intelligent Machines' Intelligent Enough?--Software the Achilles' Heel and Problem of Problems--Computer Technology and Us"]

> [Text] We talk a very great deal nowadays about the vast capabilities of electronic computers. What interests us is that they can perform millions of mathematical operations in a second, can store in their memories tens and hundreds of millions of numbers and words and solve diverse and difficult problems spanning the whole gamut of human activity. We are proud that our small country is one of the world's great producers and exporters of computer equipment. At the same time we are dissatisfied because in many cases the computers--these "intelligent machines"--are used irrationally in our country and do not have the anticipated effect. Why do they often stand idle in enterprises, in organizations and in scientific institutes? Don't they have almost unlimited capabilities of computing, optimizing and supplying solutions?!

To answer these questions we must ask ourselves at least three more. . . Are our "intelligent machines" actually intelligent enough? What can they really do? We know that they are capable of performing arithmetic and logical operations at tremendous speed, but are there programs for organizing them in such a way as to perform the computations necessary for every specific case? In other words, we come to the problem of applied computer software.

Applied software includes programs for solving specific practical problems. It is very diverse and requires not only an acquaintance with computers and their capabilities, but also skills in the given applied area, for which reason it is an object of activity of the organizations that use electronic computer equipment. Our applied programs are developed at a number of scientific institutes, computer centers, higher educational institutions etc. both for one-time use and also for repeated solution of problems of the same type. Whole sets of applied programs (so-called "packages of applied programs") are being developed for a comparatively wide range of practical problems in a given area of science or economics. But despite the strides that have been made, the applied-software situation in our country is distressing.

Let us say straight out--the shortage of applied programs is one of the main reasons for substandard computer utilization. Indeed, what can a plant do if it receives a computer minus programs? It will amortize it and the management will be obliged to assign personnel to operate it, selecting a few specialists to work out plans and programs (not from among the most experienced since in a shop the "concerns of the day" are usually of greater weight). In a year or two the specialists in question will perhaps manage to compile programs for a few bookkeeping problems, but they will hardly manage to solve any serious problems of production control. Then why are we surprised that the computers in many enterprises either are idle or are not used as intended?!

It must be clearly understood--our customers do not need "barebones" computers, but automated systems, including both hardware and programming facilities selected for specific requirements. These systems might also successfully use packages of applied programs adjusted to the parameters of the given entity.

The experience of the developed countries shows us what great importance attaches to applied software. In many of these countries the compilation of applied programs has become a specialized economic activity, a special kind of industry, while programs have become a commodity valuable in its own right, whose share of the automated systems is as much as 70 or 80 percent! That should not surprise us--the development of software is a costly, highly intellectual activity calling for well-trained specialists.

There is another aspect as well: programs can rarely be used straight off by the customer without the help of the organization that developed it or another specialized organization, no matter how good the accompanying documentation may be. The trouble is that under real conditions unforeseen questions always arise during the installation of programming facilities, in adjusting them to the entity, and during their operation. In the West this problem is solved by a wide network of so-called consultant firms. In CEMA-member countries national escort services have been set up. But due to the great diversity of applied software these services call for considerable personnel resources, materials and equipment--a problem that we have not yet fully solved.

In short, we are lagging behind in the complex of activities having to do with the development and use of software: the number of specialists at developmental organizations is inadequate; the advertising and information activity about the available applied programs is poor; the training of customers to use them is inadequate. Besides this, no economic incentives have been created for making wider use of packages of applied programs in automated systems. Systems planners prefer individual programming, which is much slower, but for that very reason much more costly, and results in higher planning fees. And during this time the electronic computers wait for their programs.

These weaknesses can be overcome, to be sure. We need only launch serious activity for the production and use of software and put it on industrial principles. The preconditions for this exist: experience has been built up; we have experimented with industrial technologies and organizational forms in the production of programs; well-trained young specialists are coming out of the institutes. Consequently we can expect that "intelligent machines" will indeed be intelligent, i.e., will solve problems that are important and necessary for practical activity--the purpose for which they were created.

6474
CSO: 2202

REPORT ON RESEARCH, ACHIEVEMENTS IN ELECTRONICS

Sofia RABOTNICHESKO DELO in Bulgarian 10 Jan 80 p 1

[Article by Docent Atanas Atanasov, deputy rector of Paisiy Khilendarski Plovdiv University: "From the Laboratory to the Practical World--Our Scientists Working on Specific Problems in the Electronization of Production"]

[Text] For scientific and technical progress to become the main burden of work during the coming five-year period the BCP Okrug Committee in Plovdiv has approved a system for the territorial administration thereof and for launching a workers' movement for technical and scientific creativity. The accelerated development of electronics and its rapid introduction into different sectors of industry and agriculture have been made the central goal of this system. It has two dimensions: on the one hand, improving the technical level and increasing electronized technology's share of production and, on the other hand, introducing electronic and electronized equipment on a wide scale.

As of the beginning of 1979 an Applied Physics Laboratory was set up in Plovdiv as an independent link within the Unified Physics Center under the Bulgarian Academy of Sciences. The laboratory's basic problem field is determined by the strategic lines of development of the science in our country and in accordance with the okrug's characteristic features. In the three sections--quantum electronics and laser technology, semiconductors and polymeric materials, and nuclear methods--there is a young staff of specialists dealing with applied-science problems in the area of the physical sciences. And the first results are here. Practical contacts have been established with a number of industrial enterprises. A contract has been entered into with the Storage Device Plant in Plovdiv to introduce the series production of special photoresistances developed under the direction of the Solid-State Physics Institute under the Bulgarian Academy of Sciences. The possibilities of using laser methods for welding, for the boring of holes and for other manufacturing operations are under study.

The laboratory will consolidate the efforts of many scientists from eight departments of different higher educational institutions and other scientific and production links. In the Physics Department at Paisiy Khilendarski Plovdiv University specialists have developed beta thickness gages for measuring thin metals and nonmetallic coatings based on metal and plastic, which have been adopted in several of the country's enterprises and are having a significant economic effect; they have also designed devices for measuring small displacements. The physicists have created high-vacuum equipment which can be used as important technological components in the production of microelectronic elements. The research in the field of ferroelectrics is promising for industry.

It is not accidental that Plovdiv was the host for the First National Physics and Electronization Symposium held at the end of last year, which considered interesting problems in the field of semiconductor microelectronic instruments and technologies, monitoring and control systems, computer technology and bionics, circuit electronics, instrument-building, quantum electronics and optoelectronics.

During the symposium a meeting of creative people was organized between science representatives and top technical and engineering workers from enterprises and plants. The Plovdiv Electric Equipment Combine raised a number of questions involving the use of electronic elements to improve the fundamental and design parameters of output, and the Storage Device Plant brought up the problem of boring small holes with specified characteristics. The practical world has made its demands on science and some of the problems will be solved very soon by interdisciplinary teams. Their activity will be organized and directed through the system for the territorial administration of scientific and technical progress.

For the new organization criteria will be devised for the effectiveness of socioeconomic results involving the use of scientific and technical breakthroughs in production, for improvement of planning, and for the provision of incentives at every stage of the science-production-implementation cycle. That is the way to intellectualize social labor.

6474
CSO: 2202

CZECHOSLOVAKIA

SCIENTIST RECEIVES USSR STATE PRIZE FOR MOLECULAR GENETIC RESEARCH

Prague TVORBA in Czech No 52, 27 Dec 79 p 10

[Interview with Josef Riman, CSAV scientific secretary and director of the CSAV Institute for Molecular Genetics by Zdenek Vavra]

[Text] At year's end Czechoslovak science was awarded a high honor. On the occasion of the 62nd anniversary of the VRSR [Great October Socialist Revolution] the 1979 USSR State Prize was awarded to Academician Josef Riman, scientific secretary of the CSAV and director of the Institute for Molecular Genetrics of the CSAV. This honor was bestowed on him jointly with nine Soviet and one GDR scientist in recognition of research conducted in the field of molecular biology--"for the series of studies carried out in the scientific project Reverse transcriptase concerned with enzyme synthesis of genes and their application in the study of the genetic apparatus of live systems and viruses, published in 1973-1977."

This is the first time in history that this great honor--the USSR State Prize has been awarded to one of our scientists. On this occasion we asked Josef Riman to grant us a short interview.

[TVORBA]: The fact that one of this year's nine USSR state prizes awarded in recognition of new important scientific discoveries was also bestowed on two foreigners together with Soviet scientists is surely no accident. It testifies to the importance of intensifying socialist integration in the field of science. Comrade academician, how and to what extent was this multilateral cooperation accomplished?

[Riman]: The results of international scientific cooperation, for which the award was given and in which I had occasion to participate as a Czechoslovak representative in charge of the CSAV Institute for Molecular Genetics, are the fruits of research conducted in the field of molecular genetics. Within the framework of the multilateral cooperation of academies of sciences of socialist countries encompassing 9 programs with 30 topics each in the field of natural and technical sciences we participated in the fourth program--Reverse transcriptase. It was introduced and defined as a project at the initiative of the Academician V. A. Engelhardt--a Soviet scientist of world renown, the founder of Soviet molecular biology--in 1973 as a program whose workload was specifically to be divided among its individual participants. Work places of 15 USSR, GDR and CSSR institutes participated in the project including approximately 40 scientists of world reputation.

The spare of our institute consisted on one hand in providing the research project with reverse transcriptase and in addition to conducting research of genetic molecules of oncornaviruses. This CSAV part of the project was made possible by findings made and the experience acquired gradually in recent years in a relatively small but productive laboratory of the present CSAV Institute of Molecular Genetics. Advance preparation of the research and the consistent application of modern methods in the biochemistry of nucleic acids made it possible to transform the work place in a comparatively short time into an experimental and methodological center not solely for our but also for numerous foreign scientists. In addition to this role as a training center our institute participated in the cooperation also as a supply source of reverse transcriptase.

The significance of the joint project lay primarily also in the manner in which we managed to arrive at the new findings. Because the project was also meant to represent a model showing how to proceed by implementing intensive efficient cooperation of scientific work places of socialist countries. It appears that further progress in this direction probably will not be achieved by a frontal attack without careful differentiation. Rather, it will be achieved by clear goal-setting, specific division of labor, ensuring the supply of instruments and materials including a highly specialized servicing and information system. Availability of the most advanced instrumentation, reliable chemicals and biomodels constitutes the prerequisite for conducting research in the field of molecular biology.

The issue is to develop such multilateral cooperation beginning with coordination all the way to finding specific solutions within a given deadline. I am deeply convinced that in this field no progress can be achieved except by integration. And the award for the thematic project reverse transcription is a specific example of such integration which, as L. I. Brezhnev said at the conference of presidents of academies of science of socialist countries in 1977 in Moscow, "not only pools our resources but multiplies them."

[TVORBA]: What results has cooperation brought and wherein lies its importance?

[Riman]: The joint project aimed at three principal goals. First, to use reverse transcriptase i.e., a reverse transcription enzyme for the enzymatic construction of special genes or their parts. Second, to apply this principle to the detailed study of the genetic composition of the cell--from the bacterial cell all the way to the animal cell. Finally, to also use the principle of fermentative transcription in practice, for example to detect tumor viruses in cattle leukemia. All the objectives were reached. In addition, we made a series of new and important discoveries.

An important finding, for example, represents the discovery of enzymes with similar or even identical characteristics such as reverse transcriptase in bacterial cells because it demonstrates that the reverse transcriptase principle apparently does not apply to tumorigenesis of the cell but is valid generally.

[TVORBA]: The high honor awarded for results of scientific inquiry also demonstrates that one stage of the research has been completed. Will such a "model project" also be repeated in the future?

[Riman]: Indeed, the fact that the project Reverse transcriptase has been successfully concluded does not mean that no new forms of cooperation will develop in the field of molecular biology.

A new project has already been chosen for the coming five-year plan within the framework of multilateral cooperation. It ties in with the joint research carried out so far and is named Oncogen. It focuses, as the name indicates, specifically on the area of the molecular mechanism of tumorigenesis of the animal cell. The CSAV Institute of Molecular Genetics will participate in it in three extensive areas of the research project, therefore, to an extent larger than in cooperation on the preceding project.

8664
CSO: 2402

APPLICATION OF SERIES 3000 MICROPROCESSOR ELEMENTS

Prague SDELOVACI TECHNIKA in Czech No 10, 1979 pp 362-368

GUCKY, TOMAS, engr.

[Abstract] The basic applications of the TESLA MH 3000 series are those of high-speed control computer, microprocessor, and microcomputer. The machine currently under design can encompass one or two programming and control levels. The simplest case of use of this series is the application of the 3001 circuit alone as a microprogram sequential automatic computer doing equivalent work to that done by a computer based on conventional logic elements. From the series 3000 circuits, it is also possible to assemble processors and digital equipment for data collection, computer peripheral equipment control, digital regulation, and process control. The article describes the application methodology, combined unit operations, combined control functions, and processor timing. It provides detailed information on the layout of microprograms for the system. In closing, the author stresses that the purpose of the article is to inspire ideas, and not to provide instructions for building a specific machine.

Figures 10; References 5: 3 Czech, 2 Western

5808
CSO: 2402

UDC 621.384.8

USE OF COMPUTERS IN PRESENT DAY NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

Prague SLABOPROUDY OBZOR in Czech Vol 40 No 11, Nov 79 pp 511-517

HALAMEK, JOSEF; STARCUK, ZENON; Institute of Instrumentation Technology, Czechoslovak Academy of Sciences, Brno

[Abstract] Nuclear magnetic resonance (NMR) spectroscopy is one of the analytical methods in which small computers are generally used in combination with the standard acceptence of Fourier spectroscopy. This arrangement requires an integral connection between the computer and the spectrometer. Computers used in similar applications are usually small units designed for this specific application. TESLA at Brno is the only manufacturer of NMR spectrometers in the communist countries. These spectrometers are of the impulse type using Fourier's transformation. The spectrometer is provided with two detectors of the QD type suitable for good interference suppression. Conversion of the signal from the time to the frequency regime is effected by an algorithm of fast Fourier transform (FFT) arranged so, that a maximum amount of information can be obtained with a given memory and this algorithm would be as fast as possible. The FFT algorithm requires a complex signal. The data obtained are continuously shown on a screen; the spectra are permanently recorded. The computer control of the spectrometer makes its operation very easy. The TESLA BS 497 spectrometer is of the CW type, connected to an ADT 4316 computer which is provided with a discriminator for 12 bytes in its analog converter. The conversion period is 20 microseconds. A Fourier transform for an 8K block takes 48 seconds. Figures 10, references 7; 4 Czech; 3 Western.

2573
CSO: 2402

BRIEFS

NEW ACADEMY OF SCIENCES INSTITUTE--On Tuesday [8 January] Prof Dr Werner Scheler, academy president, handed over the founding charter for a new research institution of the GDR Academy of Sciences. The establishment of the Institute for Chemical Technology serves the development of technological research. It is above all important to more speedily transfer the results of basic research into practice, in cooperation with industry and with other social sectors. The newly formed institute will conduct research into key national economic problems, such as a more intense utilization of domestic silicate raw materials, organic syntheses on a technical school [technikum] level, and the development of high-grade additives for the production of lubricants, and into problems related to an effective use of fossile carbon-carrying agents [kohlenstoff traeger]. Prof Dr Gerhard Keil is the head of the new research institution in Berlin-Adlershof. [Text] [AU101416 East Berlin NEUES DEUTSCHLAND in German 9 Jan 80 p 1 AU]

CSO: 2302

PROJECTS OF PHARMACEUTICAL RESEARCH INSTITUTE HIGHLIGHTED

Budapest NEPSZABADSAG in Hungarian 30 Nov 79 p 6

[Article by Paul Gabor Peto: "No Longer by Luck"]

[Text] Ten years ago, in speaking about the search for new medicines by researchers, the discoverer of a very successful Hungarian drug listed all the prerequisites for success. In addition to knowledge and perseverance, he also mentioned luck as a necessary factor.

Since that time great changes and advances have been made in the pharmaceutical industry and also in pharmaceutical research which assures the process of advancement. The role of luck decreased in the production of successful new drugs because of increased demands from them. In the future, these demands can increasingly be satisfied only on the basis of new, exactly defined biological knowledge involving modern technology, and built on basic research elucidating the function of the healthy and diseased organism. Everything related by Tibor Land, director of the Pharmaceutical Research Institute, was an illustration of this thesis.

The Pharmaceutical Research Institute is an industrial research institute functioning under the direction of the Ministry of Heavy Industry. The tasks set in its annual plans are contained in contracts with various companies and the ministry.

"Patchwork" Will Not Do

In the most highly developed drug-producing countries, the pharmaceutical companies spend 10-20-25 percent of their expenditures on research. Namely, instead of the older, broad spectrum compounds, medicine today demands more specifically "aimed" pharmaceuticals. The considerable sums spent on research are used to arrive at new theoretical recognitions on which to base the search for new drugs of preferably more specific effectiveness. The new preparations are subjected to thorough pharmacological studies, toxicological studies to establish their harmlessness, studies involving their elimination and also to very lengthy and thorough clinical evaluations. It follows that resounding international success can no longer be achieved with "patchwork", that is, with new preparations having slightly improved effectiveness over the older ones. From both the medical and commercial standpoints, much energy and money should be spent only on those preparations which represent a leap forward, a progress of decisive importance in therapy since every new preparation must hold onto its place for years in the ever increasing competition.

When the Pharmaceutical Research Institute was converted to the contractual research system, many were anxious whether they would receive sufficient assignments from industry in the future because the pharmaceutical companies also have significant research sections. But a healthy division of labor has developed with the result that the industrial research sections are now dealing more with reproduction and technological problems while the Pharmaceutical Research Institute--which represents one-fourth of the research capacity of the pharmaceutical industry--is concerned more with basic and original research. Finally, the contractual research system became successful because the institute receives a share of its applied results from the preparations which are accepted for industrial production. Already in 1978 this amounted to 30 percent of its annual budget.

In addition to careful selection of the labor force, the conditions for success are good technical equipment and a solidly based, high level biological research. Concerning technical equipment, it has happened repeatedly that, when meeting scientists from countries having a well developed pharmaceutical industry and research at official discussions, visits and congresses, members of the institute found that the technical equipment of the foreigners was not as complex as that of the institute. On the other hand, it is also true that, in spite of very effective support from the Ministry of Heavy Industry, the Committee on Science Policy, the National Committee on Technical Development and the Ministry of Foreign Commerce, automatic instruments which would have a fundamental influence on the effectiveness and modernness of research--those connected with computers and recording equipment which would print the results in form of a protocol--are not yet available or at least there are not enough of them.

The staff of the Pharmaceutical Research Institute has remained at 732 for the past 4 years, 200 of whom are engaged in research. There are 310 workers in the biology sections, 100 of them researchers: pharmacologists, microbiologists, biologists, and toxicologists. Development to the current level was made possible by the support from the National Committee on Technical Development and from the companies. For instance, the toxicological section currently performs a greater volume of work for the companies than for the institute.

It is expected of modern medicines that they should affect the pathological processes more selectively than the medicines already known: a drug should preferably affect a single, selected organ or the pathologically changed site of some physiological process. Approaching the tasks in such manner necessitates a more thorough knowledge of the physiological and pathological life processes. Such informations can form the basis not only for more precise determination of the "point of attack" by a new medicine but also for the isolation of specific receptors binding the compound. Possession of the receptors will also further the selection of new, more effective compounds.

Forecasting for as Much as a Quarter Century

The Pharmaceutical Research Institute has existed for more than a quarter century. It would be difficult to list all the compounds which had been synthesized by its researchers alone or in cooperation with industrial and academic laboratories. Therefore we will survey briefly the results achieved in only a few most important research directions.

The Pharmacological Research Institute contributed quite a few preparations to the fight against cancer and other malignant tumors: Degranol, Nyelobromol, Zitostop, Lycurim. Currently they are working on the preparation of newer, more effective compounds. There are very promising drug prospects in three groups of compounds. They are more effective and less toxic than the currently used preparations at least according to the animal experiments conducted so far.

An important research area of the institute is the preparation of drugs affecting the central nervous system. Their known products are: Trioxazin, Frenolon and Grandaxin. The latter was developed in cooperation with the researchers of the United Pharmaceutical and Nutriment Factory. The institute already has more effective compounds than this drug but they are continuing their search for significantly, qualitatively better compounds.

The therapeutic importance of neuroleptics--strong sedatives--remains great. There is a new preparation with prolonged effectiveness currently at the stage just before clinical trials which will satisfy the long-voiced demands of our neurologists, if the preliminary expectations are verified.

In recent years, the institute also has closed ranks in the search for drugs to manage cardiac and circulatory diseases. It is known that these diseases are currently in a leading position in various statistics on mortality. Developed at the institute, the antihypertensive compound, Tobanum, which also alleviates symptoms of angina, will soon be marketed by the Pharmaceutical Company of Kobanya. This compound is a match for most foreign drugs produced for the same purpose.

Nevertheless, they are not resting on their laurels but are also experimenting with additional compounds. Studies involving another type of antihypertensive compound are already at the stage of preclinical trials. The research team of the institute is also greatly involved with another antihypertensive compound because--in the words of the director--it increases in a nearly unique manner the biosynthesis of certain types of prostaglandins in the renal tissue and in the walls of vessels. Thus the biochemical and pharmacological studies are promising the birth of an antihypertensive drug with a new mechanism of action.

Active research is conducted also with anticoagulant preparations to prevent the development of thrombosis. Synthesized by them, the new types of peptides which exert a specific action at a certain point of this process and can inhibit the action of several key enzymes, are very promising.

However, going back to the role of luck in research, it can not be denied that it has often helped the researcher in the past and it also does today. Luck provides the chance but the lucky moment has to be noticed, the possibilities offered by luck must be grabbed, and the phenomena and possibilities provided by luck must be pursued and taken advantage of in a systematic manner.

The discovery of the very first drug to treat mood disorders is due to such an unexpected "lucky" stroke. When Tofranil (Imipramin) was first sent for clinical trials, they expected it to improve the condition of schizophrenic patients. Its totally unexpected mood elevating effect was recognized by the neurologist conducting the clinical trials. Thus the drug was returned to the researchers for the new task of finding experimental models--still unknown at the time--suited for testing such an effect. Finding these models made possible the systematic research for antidepressants.

From the Industrial Aspect

Another rule was discovered by the pharmaceutical researchers which could be used in many branches of the national economy. Namely: the secret of practical implementation of the research results, their "introduction" into the industry. It is true that the Pharmaceutical Research Institute has been one with the industry from the beginning, the majority of its administrators and scientists has come from industry and has brought along the spirit which had created the Hungarian pharmaceutical industry: high standards and the continual search for useable results.

The industrial approach is not strange to us--declares Tibor Lang, director. We know what is necessary for effectiveness. We are carrying out a complex task. We can perform all the work in our institute from the moment an idea is born to the production operation. We have an experimental plant in which procedures can be developed and run on an industrial scale. Our procedures are demonstrated to the companies and we can convince our colleagues working in the companies by direct, practical results. Thus we obtain cooperation from the companies for transferring our industrial procedures.

No one claims--not even the director--that this would be a very simple matter. But just as the synthesis, study and clinical trial of complex compounds can be accomplished, this also is not impossible. The pharmaceutical industry and research can withstand the competition as long as the necessary material support is forthcoming.

2473
CSO: 2502

CALCULATION OF WAVE PROPAGATION IN MICROWAVE CONNECTIONS

Budapest BHG ORION TERTA MUSZAKI KOZLEMENYEK in Hungarian Vol 25 No 4, 1979 pp 145-158

CSERNOCH, Janos, graduate physicist, engineering and scientific consultant at the Main Microwave Department of ORION Radio and Electrical Enterprise, lecturer at KKVMF [expansion unknown]

[Abstract] Calculation of microwave refraction in spherically stratified atmosphere is important in connection with the forecasting of fading. The author derived equations for the characterization of the refraction for cases where the fading is caused by gradients of the refraction coefficient in the atmosphere. While the equation of the wavepath can be expressed in a closed analytical form in case of laminar layering, it can be expressed only in an integral form in case of spherical stratification. The equation is suitable for forecasting the fading (until now only empirical date were available for this purpose). The curvature radius of the path is determined with the aid of an approximating method. The error of the approximation is estimated for both laminar and spherical stratification. The concept of the physical range and equivalent earth radius is introduced. The latter may be positive or negative. If it is negative, the beam is reflected to the earth surface (which may occur several times). Then, a well-definable layer of the atmosphere will carry the electromagnetic waves like a waveguide (with minimum attenuation). The waveguide is called a duct. There are ground-based and elevated ducts. On the basis of the equations derived, the author classifies the various cases occurring in tropospheric altitudes (up to 10 km height). In practical calculations, the earth-radius factor is determined with the curvature of the earth and the relationship between refraction coefficient and altitude being taken into consideration. In plotting geographic terrain sections, the earth-radius factor thus determined is used instead of the true earth radius. The fading is forecast on the basis of the relationship between the earth-radius factor and the refraction-coefficient gradient. The calculations described are especailly useful in long-distance microwave RF paths, and may also be used in designing highly directional antennas. Figures 14, references 10: 2 German, 1 Czechoslovak, 2 Hungarian, and 5 Western.

2592
CSO: 2502

DEVELOPMENT OF SPECIAL PURPOSE ALUMINUM ALLOYS [PART 2]

Budapest MAGYAR ALUMINIUM in Hungarian Vol 16 No 11, 1979 pp 332-337
LAKNER, Jozsef, Dr, candiate of sciences, Design and Research Institute
of the Aluminum Industry

[Abstract] Part 1 of this article was published in MAGYAR ALUMINIUM in Hungarian Vol 16 No 10, 1979. This part discusses aluminum-magnesium-silicon and aluminum/zinc/magnesium(copper) alloys, and the role of solid-state studies in the development of alloys for specific purposes. The AlMgSi alloys are refinable (short heat treatment at very high temperature followed by quick colling and long heat treatment at moderate temperature, during which the solid solution decomposes according to the following scheme: supersaturated solid solution → Guinier-Preston zone → neddle phase → rod transition phase → equilibrium phase (Mg_2Si)).

AlMgSi alloys presently made in Hungary do not achieve the maximum possible strength; however, in developing special alloys, a compromise must be made between strength and fabricability. These alloys are used in structural products (such as vehicle and construction industries, especially with Si concentrations above 1 percent), and machine parts. The AlZnMg(Cu) alloys are recent developments: with Zn concentrations of 3-4.5 percent and Mg concentrations of 0.5-2.5 percent, they are easy to form and have medium strength, can be welded; with higher (up to 8.5 percent) Zn concentrations and higher (up to 3.8 percent) Mg concentrations as well as Cu concentrations of up to 3 percent, they have maximum strength. Hungarian studies presently in progress are aimed at the development of AlZn5Mgl and AlZn3.5Mg2.5 alloys, which are already in first use, as well as AlZn5Mgl, which is ready for trials. These alloys are used primarily for structural components. Various additives impart special properties which may be useful in certain end uses. To rationalize the development of special alloys, more must be known about the segregation and recrystalization phenomena taking place, as well as the processes taking place in the course of fracture and breaking. Figures 12, references 22: 5 German, 9 Hungarian, 1 Russian, and 7 Western.

2542
CSO: 2502

TRANSPORTATION COMPUTER CENTER TASKS, HARDWARE DESCRIBED

Warsaw AUTOMATYKA KOLEJOWA in Polish No 7-8, Jul-Aug 79 pp 193-201

[Article by Tadeusz Hipp, M. Sc.: "The Role and Missions of Main Transportation Information Science Center"]

[Excerpts] In 1976, the minister of transportation established COIK [Main Transportation Information Science Center] assigning it to coordinate the progress of information science applications and statistics and accounting in the transportation sector.

Coordination of information science development includes:

--determination of directions for and development of plans of information science applications, and monitoring their implementation,

--coordination of research, design and application, and determination of interrelationships between computerized information systems in terms of their cohesiveness in particular subbranches of the sector,

--budgeting of resources, determination of purchase priorities and standardization of hardware necessary for the development of information science and monitoring hardware utilization,

--determination of directions and needs in specialized personnel training and retraining, and conducting evaluations of their use,

--keeping a central register of computerized information systems in use,

--development of organizational structuring of information science units (cells) in particular subbranches of the transportation sector.

In the area of statistical and reporting development projects the COIK was directed

--to establish annual plans of statistical studies,

--to develop methodological and organizational guidelines,

--to conduct research and process research results.

Along with the coordinating function, COIK's primary mission is to develop, apply and operate computerized information systems used for management purposes by the ministry of transportation PKP [Polish State Railroads] General Directorate and other organizational subunits in the railroad sector. Moreover, the COIK is to assist in the management of rail shipping.

Within the bounds of tasks entrusted to it, the COIK closely collaborates with international organizations including:

--the Council for Mutual Economic Cooperation (CEMA),

--European Economic Commission (EEC),

--Railroad Cooperation Organization (OSZhD),

--International Rail Union (UIC).

It also cooperates with numerous rail directorates under bilateral or multilateral agreements. The COIK participates in the work of the Intergovernmental Commission (of the socialist countries) for matters concerning production of uniform system of computer hardware.

All of these tasks are being carried out by the COIK (functioning as a managerial board) and by four Railroad Information Science centers (operating as computation centers) located in Warsaw, Sosnowiec, Olsztyn and Lodz.

Within the purview of the Ministry of Transportation, the COIK supervises and coordinates the activities of:

--PKP information science centers, operating in all district directorates of the state railroads, established by the minister of transportation in 1977 in response to the COIK's motion,

--Main Center Information Science Center for Road Engineering, operating within and for the Central Management of Public Roads,

--Automobile Transport Computer Science Center, working for, and within the framework of, enterprises that are grouped under the PKS [State Automobile Transportation] Association and in that sector's scientific and technical support base.

--the Air Transport Information Science Center, functioning within the structure of the Polish Airlines (LOT),

--Computerized Information Unit, operating under Inland Water Shipping Association,

--Information Science Center operating in the Rolling Stock Repair Plants Association,

--Railroad Construction Information Science Center, operating under the Railroad Construction Enterprise Association,

--The Computerized Information Unit in the Signalling Devices Manufacturing Plants.

The Organizational Make-up and Employment Composition

Personnel development is a major precondition for the development of information science. This is particularly applicable to specialists in computerized information systems design and programming, technical servicing and data-processing and data-preparation operators. Employment growth in 1975-1979 in the transportation sector's organizational subdivisions for information science is broken down by specialty and education in Table 1.

Table 1.

		(c) Rok	(d) Ogółem	(a) Pracownicy działalności podstawowej							(b) Prac. działalności pomocniczej	
				(e) razem	(f) projektanci programiści	(g) operatorzy		(j) konserwatorzy		(m) pozostali	(n) administracyjno-biurowi	(o) pozostali
						(h) razem	(i) w tym komputerów	(k) razem	(l) w tym komp.			
Resort (p) komunikacji	A	1975	2433	2101	339	908	140	212	93	642	215	117
	B		410	382	256	4	1	40	35	82	25	3
	C		1538	1379	83	665	138	158	56	475	151	8
COIK	A		1440	1212	75	542	55	110	42	485	142	86
	B		135	116	61	3	—	21	18	31	19	—
	C		936	842	14	374	55	77	22	377	94	—
Resort (p) komunikacji	A	1976	2744	2359	416	1084	217	262	117	597	267	118
	B		511	463	303	3	2	66	56	91	48	—
	C		.	.	.	.	.	.	.	.	.	.
COIK	A		1472	1235	89	600	98	108	41	438	151	86
	B		152	120	66	—	—	20	19	34	32	—
	C		924	842	23	417	98	83	22	319	80	2
Resort (p) komunikacji	A	1977	2844	2484	461	1028	224	281	141	714	222	138
	B		587	555	324	1	1	79	66	151	26	6
	C		1792	1601	136	829	216	196	75	440	179	12
COIK	A		1492	1285	95	572	121	121	64	499	110	97
	B		176	137	75	1	1	25	24	36	35	—
	C		923	853	18	419	99	87	24	329	68	2
Resort (p) komunikacji	A	1978	3044	2766	523	1091	272	287	153	742	212	45
	B		763	642	393	12	7	76	68	144	22	2
	C		1875	1690	133	853	263	207	81	427	160	11
COIK	A		1502	1384	116	596	138	119	64	553	106	9
	B		195	180	91	9	4	26	24	54	13	2
	C		965	884	25	445	134	91	38	323	74	7

A — razem (q)   B — z wykształceniem wyższym (r)   C — z wykształceniem średnim (s)

Key:

(a) primary operations personnel
(b) auxiliary operations personnel
(c) year
(d) total
(e) subtotal
(f) designers and programmers
(g) operators
(h) subtotal
(i) including computer operators
(j) maintenance personnel
(k) subtotal
(l) including computer maintenance personnel
(m) others
(n) administrative and office personnel
(o) other

(p) transportation sector
(q) total
(r) with higher education
(s) with secondary education

Available Hardware

Hardware for information science is a major factor stimulating rates of growth in its applications. None but optimistic evaluations of this issue can be offered for the most recent past period.

Within the COIK organization alone, the number of Odra 1305 computers increased from 3 to 9, which enabled all four calculation centers to complete a switch to computerized calculations exclusively. Furthermore, a number of previously unused modern auxiliary devices have been introduced. In 1976, the OIK in Warsaw first put into use two magnetic tape Seecheck system units of Redifon company, in a configuration including two central units, and a line printer, each with 20 keyboards with monitors.

In 1978, remote direct access was first made available from the terminals installed in the Ministry of Transportation building to data banks stored in computer memories of the OIK in Warsaw.

By the end of 1978, the value of hardware installed in subdivisions of the transportation sector was 1,010,875 thousand zlotys.

Rail transport	741 813 000 zlotys--73.4 percent
Auto transport	109 093 000 zlotys--10.8 percent
Road engineering	129 241 000 zlotys--12.8 percent
Air transport	26 503 000 zlotys-- 2.6 percent
Inland watet transport	4 223 000 zlotys-- 0.4 percent

Data on computer science hardware are given in detail in Table 2.

[Table on next page]

Table 2

Available Computer Hardware (as of Dec 12, 1978)

Wyszczególnienie (b)	(c)	(a) z tego:							(d)	(a) z tego:							
	Komputery ogółem	ODRA 1204	ODRA 1304	ODRA 1305	ODRA 1325	ICL 1903	DATA POINT 6600	RC 3600	Minikomputery ogółem	MERA 301	MERA 302	MERA 303	MERA 305	MERA 306	DATA POINT 2200	NOWA 1200	WANG 2200
Ogółem Resort (e)	28	1	3	14	7	1	1	1	74	2	16	21	23	2	2	1	8
I. Transport Kolejowy (f)	23	1	3	10	6	1	1	1	56	2	9	21	18	—	2	—	4
A. Przedsiębiorstwo PKP (g)	17	—	—	8	6	1	1	1	43	—	8	21	12	—	2	—	—
z tego: COIK	9	—	—	7	1	1	—	—	1	—	1	—	—	—	—	—	—
DOKP	8	—	—	1	5	—	1	1	37	—	5	21	9	—	2	—	—
CR	—	—	—	—	—	—	—	—	5	—	2	—	3	—	—	—	—
B. Zaplecze techniczne (h)	4	—	3	1	—	—	—	—	2	—	—	—	2	—	—	—	—
z tego: CNTK	2	—	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—
CPRK	2	—	2	—	—	—	—	—	2	—	—	—	2	—	—	—	—
C. Zaplecze badawczo-rozwojowe i projektowe (i)	2	1	—	1	—	—	—	—	11	2	1	—	4	—	—	—	4
z tego: COB	2	1	—	1	—	—	—	—	4	2	—	—	2	—	—	—	—
CBP	—	—	—	—	—	—	—	—	7	—	1	—	2	—	—	—	4
II. Transport samochodowy (j)	2	—	—	1	1	—	—	—	1	—	—	—	—	—	—	1	—
III. Drogownictwo (k)	2	—	—	2	—	—	—	—	17	—	7	—	5	2	—	—	3
IV. Transport lotniczy (l)	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—
V. Żegluga śródlądowa (m)	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1

Źródło: Sprawozdawczość GUS (wzór: A-01) — Roczne sprawozdanie z dzialalnosci ośrodka informatyki w 1978 r.

Key:

(a)	including
(b)	category
(c)	computers total
(d)	minicomputers total
(e)	total for the sector
(f)	rail transport
(g)	PKP enterprise, including
(h)	Technical support base, including
(i)	research/development and design, including
(j)	auto transport
(k)	road engineering
(l)	air transport
(m)	inland water transport

Source: GUS reporting (model A-01), annual information science center activity report for 1978.

COIK--Main Transportation Information Science Center
DOKP--Information science center for PKP district directorates
CR--Rail Traffic Directorate of the DG [?] PKP
CTNK--Rolling Stock Repair Plants Association
CPRK--Rail Works Enterprise Association
COB--Main Rail Technology Research and Development Center
CBP--Main Research and Design Office for Railroad Construction

We have succeeded in largely standardizing data processing equipment both in the computer category (machines of ODRA-1300 series) and in minicomputers (MERA-300), which advantageously affects the development of large, branch-inclusive or sector-inclusive systems, and even links with nationwide systems.

The growth rate in data processing equipment was parallel with an increasing degree of their efficient utilization and improved indexes of operation and technical preparedness. The transportation sector's level of utilization of computer hardware is diversified. It reaches 136.4 percent of calendar time in the COIK, commanding the bulk of computer capabilities designated for batch data processing, while in other centers of the transportation sector it amounts to 82.3 percent.

An additional element, characteristic of the intense utilization of computer hardware, is the multiprogram operation time index. Work in this mode is, however, essentially contingent on combinations of auxiliary devices representing part of a calculation center's total equipment. Only 13 computers can operate in the multiprogram mode in the ministry of transportation information science subdivisions. Each year, some advances are noted in this area. They are not fully satisfactory yet, and this matter should continue to merit considerable attention.

In 1978, computer hardware was utilized in computerized information centers, as designated, in the following breakdown:

--47.1 percent for management purposes,

--46.8 percent for controlling transport processes,

--6.1 percent for other operations, including research, design and engineering

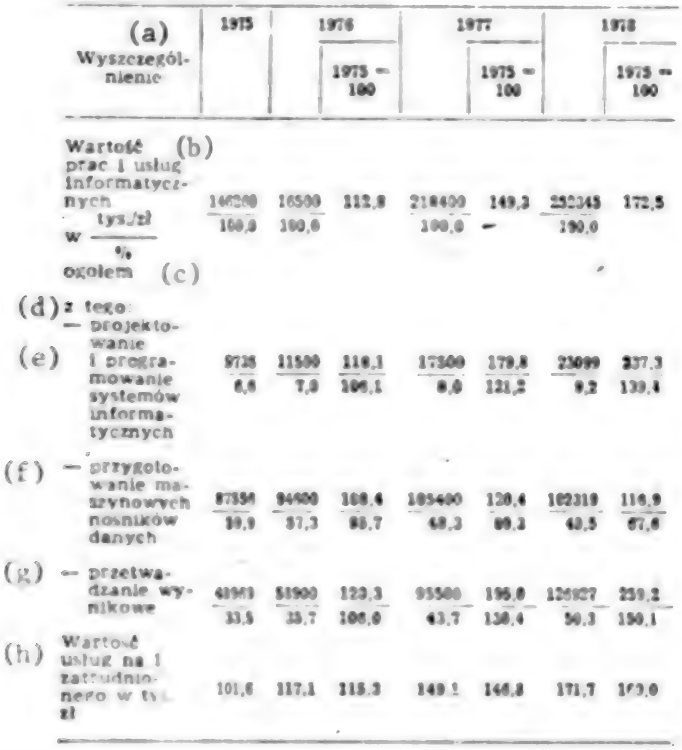
In 1978, 482.2 million zlotys worth of computation services were performed in the transportation sector. In a breakdown by subbranch, the information science units had the following shares:

--rail transport	70.5 percent
--auto transport	14.3 percent

--air transport	2.1 percent
--road engineering	11.3 percent
--other	1.8 percent

The COIK, largest specialized organization providing information science services within the transportation sector, is operating several dozen computerized information systems for the use of the PKP and the Ministry of Transportation. Owing to the application of new systems and the development of those already in operation, contingent on the completed modernization of computer hardware, the COIK exhibits a fast rate of growth in the volume of services along with a steady rise in total productivity index expressed as the value of services per employee. Detailed data are presented in Table 3.

Table 3
Volume of Information Science Services and Total Productivity in the COIK Organization in 1975-1978



(a) Wyszczególnienie	1975	1976	1976 1975 = 100	1977	1977 1975 = 100	1978	1978 1975 = 100
Wartość (b) prac i usług informatycznych w tys./zł / % ogolem (c)	146200 100,0	16500 100,0	112,8	218400 100,0	149,3 —	252345 100,0	172,5
(d) z tego:							
(e) — projektowanie i programowanie systemów informatycznych	9735 6,6	11500 7,0	118,1 106,1	17500 8,0	179,8 121,2	23099 9,2	237,3 139,4
(f) — przygotowanie maszynowych nosników danych	87550 59,9	94900 57,3	108,4 95,7	105400 48,3	120,4 80,3	102319 40,5	116,9 67,6
(g) — przetwadzanie wynikowe	48963 33,5	58900 35,7	123,3 106,0	95500 43,7	195,0 130,4	126927 50,3	259,2 150,1
(h) Wartość usług na 1 zatrudnionego w tys. zł	101,6	117,1	115,3	149,1	146,8	171,7	169,0

Key:

(a) category
(b) value of information-science activities and services in 1,000 zlotys
(c) total
(d) including
(e) design and programming of computerized information systems
(f) preparation of machine data carriers
(g) outcome processing
(h) value of services per employee in 1,000 zlotys.

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ADOPTION OF COMPUTER TIME-SHARING SYSTEMS FEASIBLE

Bucharest REVISTA ECONOMICA in Romanian No 40, 5 Oct 79 p 16

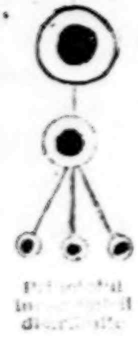
[Article by Dr George Vladimir, Piatra Neamt Territorial Computer Center]

[Text] The Draft of the Program-Directive for Scientific Research, Technical Development, and Introduction of Technologic Progress, provides guidelines for the large scale utilization of automatic methods and modern computing technology in the management of socioeconomic processes and of activities of economic units, and in the formulation of the best approaches to the formation and operation of computer and data transmission networks; these guidelines can be followed in the light of current and future needs, by considering their comprehensive and interdependent nature. This condition must be met so that the computer resources which now exist or which will be available at any given time, will be exploited in an optimum fashion, and will provide the largest volume of diverse facilities to the greatest number of users.

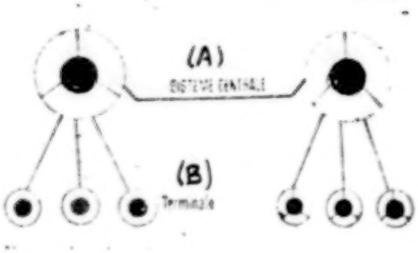
The introduction and improved utilization of automatic data processing systems is one of the criteria and conditions for the new quality, which stipulates higher technologic and qualitative levels for all material production, a more intensive assertion of the technical and scientific revolution, and the introduction of the latest discoveries in all areas of socioeconomic life.

Throughout the world, the appearance of microprocessors, minicomputers, ROM memories, functional data processing devices, the so-called artificial intelligence, and so on, has changed the conventional concept of automatic data processing, imposing instead the idea of time-shared data processing, which distributes the power of a computer to different but connected, geographic points. In the PAD (Automatic Data Processing) domain, this provides a judicious balance between centralized control and local autonomy.

Time-shared computing performs the following functions: information processing -- the handling of information to obtain desired results; data management -- the performance of logical and physical operations to utilize



Principle of time-shared information processing



Example of hierarchical time-shared system. It includes an intelligent program control obtained from terminals. For data stored at local levels, the format is displayed on a local screen, with the operator placing the information into a memory by means of a keyboard. All errors are indicated when the data is examined at introduction, and the operator can correct them on the spot. If the data is correct and complete, the controller addresses the central system; if an incident arises at the central processor level or in the means of transmission, the data is stored for subsequent communication when the system is rejoined.

Key: (A) Central systems
(B) Terminals

files and data bases; resource management -- the availability of logical and physical operations to define, create, and exploit the transmission of information to remote points.

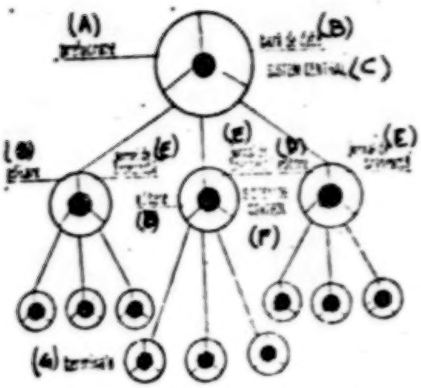
It also offers substantial advantages:

Provides a short response time at local stations, since the processing is performed in the immediate vicinity of the event location;

Reduces transmission costs;

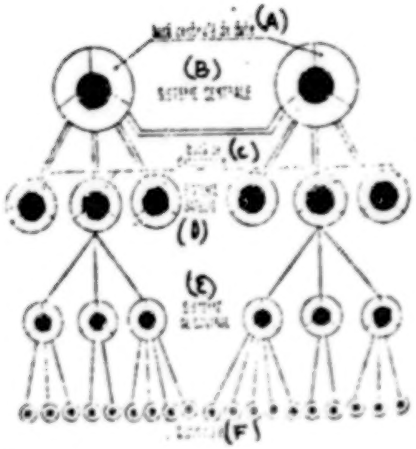
Enables a better adaptation to local conditions;

Improves reliability;



Example of horizontal time-shared system. Two Felix systems at different locations, are connected by a data transmission line. Each of the two computers meets local processing needs. Information of general interest can be exchanged between them. In addition, various subunits in the economic units enjoy a high degree of autonomy and flexibility in combining and using information. When one of the computers is overloaded with batch work, the data can be transmitted to the other for processing, thus obtaining optimum loading of computation facilities.

Key: (A) Processing
(B) Data base
(C) Central system
(D) Editing
(E) Transaction journal
(F) Control system
(G) Terminals



Example of hybrid time-shared system, combining vertical and horizontal time-sharing.

Key: (A) Central data base
(B) Central systems
(C) Local data base
(D) Peripheral systems
(E) Control systems
(F) Terminals

Offers the possibility of disseminating information to all levels of an enterprise.

Users are free to choose a time-shared system that will match their computing and control requirements.

The Romanian selection of computers, and in particular the systems Felix C-256 and C-512, fulfill the requirements of time-shared computation, while offering users the availability of special conformations. Their modular structure allows the formation of a tandem system, assigning the principal role to the Felix C-512 -- or larger -- system. The Felix C-512 or Felix C-256 systems can be placed in a hierarchic or horizontal time-shared network. The peripheral processor Felix MC-18 can perform local autonomous processing and transmission, utilizing its own data base. Other operations are directed toward more powerful systems -- Felix 256, 512, or larger. Elementary operations can be performed by terminal controllers, which can analyze, format, and transmit data before addressing the information to the peripheral processor. This procedure offers a double advantage, insofar as it reduces the network load while shortening the response time for most transactions.

Time-sharing answers the demand for decentralization, and most often makes it possible to reach decisions of local interest, thereby easing the task of central administrations.

The minicomputer Felix MC-18, included in a time-shared system, can play the role of peripheral computer, terminal controller, large terminal, concentrator, or message distributor. At remote locations, it provides local management of resources and reduces costs, multiplexing several lines into a single connection to a central system and being perfectly compatible with the Felix C-256 and C-512 systems.

The satisfactory operation of a time-shared system depends on a number of factors, the more important of which are: efficient management of transmission, that is, of the lines and terminals which constitute the physical resources; and flexible management of messages, in terms of quantity and logic loading, origin, and destination.

In emphasizing the value of this new concept, and the fact that the material conditions for its introduction in Romania have been created through the domestic production of computer technology, I believe that the designers of information processing systems must adapt themselves to the new developments that are taking place throughout the world, and that they must engage all their creativity to achieve time-shared processing systems with superior performances, based on the computers already existing in territorial centers, and aimed at completing the National Computer Network (RENAC) so that the management of entire national economy could be integrated into computer methods.

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